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Lake Superior told me, viz., that any time during the winter violets could be obtained by digging away the snow. *Adenocaulon bicolor* Hook., I found in June, three feet high, in full blossom, and having almost a tropical luxuriance; and towards the middle of that month *Lathyrus ochroleucus* Hook., twined its elegant wreaths of cream-colored or pale-yellow flowers in graceful profusion. Instances might be multiplied did space permit. — HENRY GILLMAN, *Detroit, Mich.*

ZOÖLOGY.

GLYCERINE FOR PRESERVING NATURAL COLORS OF MARINE ANIMALS. — While collecting on the coast of Maine last summer I made numerous experiments with glycerine, most of which were eminently satisfactory. At the present time I have a large lot of specimens which have the colors perfectly preserved and nearly as brilliant as in life. Among these are many kinds of Crustacea, such as Shrimp and Prawns (*Hippolyte*, *Crangon*, *Palæmon*, *Mysis*, etc.), Amphipods and Entomostraca; also many species of Starfishes, Worms, Sea-anemones (*Alcyonium*, *Ascidians*, etc.). The Starfishes and Crustacea are particularly satisfactory. The internal parts are as well preserved as the colors, and in these animals the form is not injured by contraction, as it is apt to be in soft bodied animals, either by alcohol or glycerine. The only precaution taken was to use *very heavy* glycerine, and to keep up the strength by transferring the specimens to new as soon as they had given out water enough to weaken it much, repeating the transfer two or three times, according to the size or number of specimens, or until the water was all removed. The old can be used again for the first bath. In many cases the specimens, especially Crustacea, were killed by immersing them for a few minutes in strong alcohol, which aids greatly in the extraction of water, but usually turns the delicate kinds to an opaque, dull white color, but this opacity disappears when they are put in glycerine, and the real colors again appear. Many colors, however, quickly fade or turn red in alcohol, so that such specimens must be put at once into glycerine. Green shades usually turn red almost instantly in alcohol. Specimens of various Lepidopterous larvæ were also well preserved in the same manner.

The expense is usually regarded as an objection to the use of glycerine. The best and strongest can be bought at about \$1 per pound, but recently I have been able to obtain a very dense and colorless article at 42 cents per pound, which is entirely satisfactory. As there is no loss by evaporation, the specimens will keep when once well preserved, if merely covered by it. The expense for small and medium sized specimens is not much more than for alcohol. — A. E. VERRILL, *Yale College*.

DOES THE PRAIRIE-DOG REQUIRE ANY WATER? — Prairie-dog towns on the Plains are often situated miles away from any water that can be discovered on the surface. It is the general belief among those who are

familiar with the habits of the prairie-dog, that he does not require any more water than is contained in the grass roots on which he feeds. Gen. Marcy, in his "Army Life on the Border," expresses this belief. "When the grass is growing, and the roots are tender and full of sap, it is easy to believe that this is the case. It is, however, difficult to understand how sufficient moisture could be contained in the food of the prairie-dog to replace what must be lost in respiration, etc., and to carry on the process of digestion during the months of September, October and November. At this season of the year it is not unusual for from fifty to sixty days to pass without a drop of rain falling. There is no dew, the air is extremely dry, and the short buffalo-grass (often the only thing which grows on the highlands where the prairie-dog villages are commonly found), becomes completely dried down to the roots, while the roots, being but two or three inches underground, become hard and dry.

Tame prairie-dogs are frequently seen to drink water. My belief in regard to the matter is, that in every prairie-dog town there are a sufficient number of wells to supply the inhabitants with water.

In attempting to flood dogs out of their holes for the purpose of obtaining the young ones for pets, I have found some holes that could be filled to the brim with two barrels of water, and from these holes have obtained young dogs. In other holes I have emptied three or four barrels in immediate succession, and instead of filling the holes, have heard the water last poured, continue running with a rumbling noise, deep in the ground, for a minute or more after my supply was exhausted. These holes it seems to me must be deep enough to answer the purpose of wells, and I can conceive of no other object that could induce the dogs to burrow so deeply, than that of obtaining water. They are generally of greater diameter than other holes, and go down straight from the entrance instead of obliquely as do others. While they show signs of being constantly resorted to by the dogs, they do not have the same appearance of being lived in by a family. The excrement of the dogs does not lie around them in such abundance, and the grass near has not been so extensively rooted up for food.

The prevailing belief among frontiersmen, that prairie-dogs, rattlesnakes and prairie owls all live together on friendly terms, in the same hole, is doubtless a mistake. It is founded upon the fact that rattlesnakes and dogs have been seen to come out of the same hole. The snake in such instances had, probably, been after a young dog for dinner. The prairie owl probably finds his food around dog-towns, and makes his home in deserted holes.—GEORGE M. STERNBERG.

BREEDING HABITS OF SALAMANDERS AND FROGS.—There is still a great deficiency in our information concerning the breeding habits of these animals, which many young naturalists residing in the country ought to make an effort to supply this spring. Careful observations made upon any of our frogs, recording the first appearance, the time and place of laying the eggs, the form and appearance of the egg-clusters and how

attached, the duration of the laying period, etc., are all worthy of record, as is also the history of the development of the young, but specimens of every species of which the habits are noted should be preserved in alcohol, so that the species may be accurately determined. The young should be reared, and a full series preserved, with dates.

Concerning the breeding habits of our Salamanders little is known. Mr. Putnam and others have observed the eggs of the Red-backed Salamander, which are laid under rotten wood, etc., in moist places, and are cared for by the mother, who also broods the young when hatched. The young very quickly lose their external gills, and pass rapidly through the tadpole state. Prof. Baird observed a species of *Desmognathus* which wrapped the eggs around its body, and remained in a moist place until they were hatched. Our common *Desmognathus fuscus*, or Painted Salamander, was observed by me in Maine, where it lives under stones in cold brooks and springs. It attaches its large ivory-white eggs in patches upon the under sides of stones. The young retain their external gills until they are nearly full grown, and at least three inches long in some cases. The eggs of the common Water Newt (*Diemictylus viridescens*) were observed by Mr. S. I. Smith and myself at Norway, Maine, in 1863 and '64, where they were found attached in rounded masses, two or three inches in diameter, and resembling frogs' eggs, on the stems of water plants growing in ditches in a meadow. The eggs were found May 5th, and the young were reared by Mr. Smith. They were hatched May 17th, and by the first of October had become one and a half inches long, with rather stout bodies and broad heads, and still retained their external gills, though they had partially acquired the colors of the adult. The experiment was then discontinued, but the specimens were all preserved.

In this species the male, at the breeding season, clasps his hind legs around the body of the female just behind her forelegs, and from the fact that a pair taken late last fall and kept in confinement were often seen in this position, it is probable that it commences breeding very early in the spring. Under sexual excitement the colors and appearance change considerably. The hind legs of the male become much swollen, and a black callosity forms on the inner sides, which aids in giving firmness to his grasp. These characters soon pass away after the eggs are laid. In salamanders and frogs the eggs and the milt are discharged simultaneously, and the eggs are fertilized in the water. So far as I know nothing has been published concerning the eggs or breeding habits of any of our other species, several of which are very common.—A. E. VERRILL, *Yale College*.

THE BITER BITTEN.—Two or three years ago a student, Mr. William Stone, while on an excursion to Mt. Carmel, a few miles from New Haven, caught a large Black Snake (*Bascanion constrictor*), and brought it home, living and uninjured, except that it was partially suffocated from having been carried by the neck. In consequence of this, probably, it became sick soon afterwards, and vomited a fine specimen of the Copperhead

(*Ancistrodon contortrix* B. and G.), about two feet long, and nearly perfect, except that the head showed signs of incipient digestion. Soon afterward this was followed by a good sized frog, somewhat farther advanced in digestion.

How the Black Snake managed to capture the Copperhead without being bitten is quite a puzzle. Possibly he took the Copperhead at a disadvantage, while he was busily engaged in swallowing the frog and so swallowed both snake and frog together.—*Ib.*

CITATION OF AUTHORITIES.—Without intending to discuss a question which has caused much controversy, I call attention to the fact that after a good genus has been proved, as in taking *Unio* from *Mya*, such genera are gradually adopted as occasion offers, and it is sometimes difficult to ascertain who first stated in print the fact known to all, of a given species of described *Mya* being a *Unio*.

Mr. Prime in his earliest paper on *Pisidium* (since corrected), cited Gould for *P. dubium* (*Cyclas dubium* of Say), with the synonym *P. abruptum* Hald. (Proc. Acad. Nat. Sci., July, 1841), the latter being the first to give the proper genus. If a painter were to copy a figure of Adam from Angelo, and of Eve from Dubufe, this rule would make him the proper author of both, in the new combination. But the description of *Pisidium abruptum* of July was corrected in October, in the words "*Pisidium abruptum* is not distinct from *P. dubium* Say," which, under this rule, gives me a citation to which I would not have been entitled had I not committed a blunder.

Some authors cite Prof. Baird for the Bluebird (a Linnéan species, *Sialia sialis* (Pacific R. R. Reports, Vol. 9, p. 222, October, 1858); but if the species is not Linné's, it is mine, because I mentioned it fifteen years previously as "The familiar Bluebird (*Sialia sialis*)," in a chapter on the Zoölogy of the State, in Trego's Geography of Pennsylvania, 1843, p. 77.

In the "American Journal of Conchology," Vol. 4, p. 272, a rule is proposed that "the name of the author of a species, or genus, or family, shall remain forever attached thereto, and shall be considered a part of the said specific, generic, or family name."—S. S. HALDEMAN.

THE LOGGERHEAD SHRIKE.—In the September and February numbers of the NATURALIST questions are asked about the Butcher Birds returning to its empaled prey. As I have lived South, I have never seen a Butcher Bird, and so can say nothing as to its habits, but as for its Southern brother, the Loggerhead Shrike (*Collyrio Ludovicianus*), I have often watched it return to the prey which it has killed and hung on thorns. In the month of January last, in the State of Florida, I saw a Loggerhead attack a snake, of the genus *Leptophis*, nearly two feet in length, and after a sharp contest, succeeded in dispatching it. Taking it in his bill, he empaled it on the thorn of an orange tree near by, and leaving it there, flew away. A day or two after, as I was passing by, I noticed that the snake had been more than half devoured. Sitting down behind some bushes near by, I determined to keep watch, but had not remained there

long, when the shrike flew to the tree, and after eating off a small piece, again flew away. I saw this repeated next day, but by this time the remainder of the snake had become dried up and hard, and though I watched several times, he did not return to it. Since then I have often seen them return to lizards and tree toads which they had empaed. — H. S. GEDNEY, *Potsdam, N. Y.*

CASE WORMS. — Every dabbler in pools is acquainted with the singular Caddis or Case-worms, which walk over the bottom like moving sticks, or a mass of animated sawdust, or minute pebbles when the bottom is

Fig. 32.



composed of either of those substances. The most puzzling form is that which we here figure (Fig. 32), received from a correspondent in the Middle States. It is a species of *Helicopsyche*, and was by some conchologists (I. Lea, Transactions American Philosophical Society, 1834, p. 101)

thought to be a fresh-water shell (*Valvata*). It is extremely interesting as repeating among the aquatic neuropterous larvæ the form of the snail-like terrestrial larva of *Psyche helix*, a moth.

Regarding these cases, Dr. Hagen writes us as follows: "Phryganeid cases like those sent, are described by me in the Stettin Entomologische Zeitung, 1864, p. 130, as *Helicopsyche glabra* Hagen, from a specimen received from the collections of Prof. Dunker, labelled *Valvata arenifera* Lea, North America. The *Valvata arenifera* Lea, from Tennessee, Cumberland River, near Nashville, seems different, and my specimens described (Zeitung, p. 129, No. 8) from Mexico, are perhaps identical.

"*H. glabra* is mentioned in a "Note on Certain Insect larva-sacks, described as species of *Valvata*" (from Troy, N. Y.) by Mr. Th. Bland, Lyc. Nat. Hist., New York, Vol. 8, p. 144, and the case and the parts of the broken imago were identified by me and described in the Entomologist's Monthly Magazine, Vol. II, p. 252, and Stettin Entomologische Zeitung, 1866, p. 244. The cases are identical with my *Helicopsyche glabra*, and the imago with my *Notidobia borealis*, Synopsis of North American Neuroptera, Vol. 1, p. 271. It has also been received from Canada.

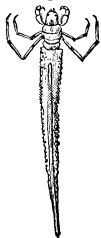
"I have seen the pupa skins, but never the larva, neither the operculum of the case. The description of the larva would be very interesting. Perhaps you will find an *asymmetrical* animal, to judge from its manner of living in a trochiform sack. I think this would be the first asymmetrical larva among the hexapodous insects.

"Among the described American Phryganeidæ, I have no doubt that *Notidobia lutea* Hagen, pertains to *Helicopsyche*. Brauer has described (Voyage of the Novara, Neuroptera, Vol. 1, p. 26-30) and figured the larva and pupa of *Helicopsyche Ceylonica*, and says nothing about an asymmetrical position, but not having seen the living specimens, perhaps it was overlooked. Prof. Von Siebold long since wrote to me that he supposed that an asymmetrical posture would be observed in the living larva.

"In the Stettin Entomologische Zeitung, 1865, p. 205, I have given a list of the described American molluscan species, pertaining to the *Helicop-*

syches. I remarked that Frauenfeld (Wiener Zoologisch-Botanischen Gesellschaft, 1864, p. 623) proves that *Paludina lustrica* Say, is a mollusk, and not a *Helicopsyche*, as supposed by me from a specimen in the collection

Fig. 33. of the celebrated conchologist, Prof. Dunker."



We also figure (Fig. 33) an interesting form found near Portland, Maine, by Rev. E. C. Bolles. The larva builds a thin long conical sandy tube, supported between two "needles" of the pine. We do not know the adult form.

Fig. 34 (larva and case) represents a very abundant Case-worm, which we have found in great abundance in Labrador. Though we do not know the imago, we suppose it is the *Limnophilus subpunctulatus* Zetter-

stedt, a very abundant species in the arctic regions.

The imago of the Caddis-fly has a rounded body, with moderately broad, parallel veined wings, which are folded on the sides of the body, and the head is provided with long antennae and palpi. The smaller species are often hardly distinguishable from many small moths. The females lay their eggs in gelatinous masses on aquatic plants, above or beneath the surface of the water. The larvæ are found abundantly in the bottom of ponds, in cylindrical cases of grass or stems of reeds, or bits of sticks, sand, minute shells, etc. They assume different forms, sometimes a long, conical shape, or imitating snail shells. The larva lines the interior with silk, and by bristles on the side of the body and a pair of anal hooks keeps its body adhering to the sides of the case while it drags it over the bottom. They eat large quantities of minute water fleas (entomostraca) and small insects, while many are herbivorous, the larger ones eating whole leaves that have been submerged, while the smaller ones leave the veins entire. When about to change to pupæ, the larvæ close up the mouth of the case with a net-work like a grate for the passage of the water for respiration. When about to leave the pupa state they crawl up stems of plants, or the smaller species use their light cases as rafts to rest upon as their wings are drying.

Neuronia semifasciata (Fig. 35) is our largest species, and is taken away from damp places; but the smaller species are only taken on leaves of bushes and herbage by streams and ponds. They run swiftly, but fly with some difficulty. The species are numerous. We should be greatly obliged for living specimens of the *Helicopsyche*. — A. S. P.

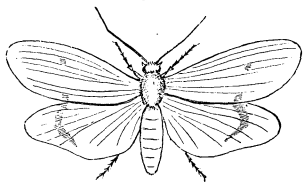


Fig. 35.

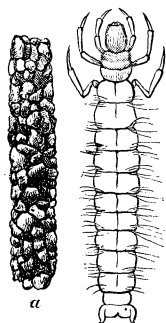


Fig. 34.